

Employees' perspective on the effectiveness of ISO 9000 certification: A Total Quality Management framework

Tsuang Kuo^{a*}, Tsun-Jin Chang^b, Kuei-chung Hung^a and Ming-yuan Lin^a

^a*College of Management, National Sun Yat-sen University, Kaohsiung, 804 Taiwan;*

^b*Department of Marketing Management in Kaohsiung Campus, Shih Chien University, Kaohsiung County 845, Taiwan*

ISO 9000 has been widely adopted as a quality management system for improving competitiveness around the world, but with mixed success. As most competitors in the industries that require ISO registration are already registered, companies are now looking for tangible internal benefits from the standards. This study utilises a survey instrument directly tied to MBNQA criteria, frequently used to represent the various views of the constructs associated with TQM, to examine the effectiveness of ISO 9000 implementations towards Total Quality Management practices and operational performance from employees' perspective. Two observations are concluded: (1) ISO certifications significantly improve the effectiveness of quality management practices. Small divisions claim more improvement than large ones. Service experienced better improvement than manufacturing in five out of six areas investigated. Experienced divisions enjoy more improvement than novice ones. (2) ISO certification does bring significant benefits to improve the level of quality performance. While the effect of size is mixed, neither the years of registration nor the nature of operations has an effect on quality performance.

Keywords: ISO 9000; Total Quality Management; MBNQA

Introduction

The advent of the ISO 9000 has made quality management even more prominent regarding the pursuit of Total Quality Management (TQM) programmes for organisations to improve competitiveness. ISO 9000 standards, launched in 1987 and followed by two revisions in 1994 and 2000, claims to be a generic management system standard. Generic means that the same standards can be applied to any organisation. Management system refers to that the standard can help an organisation reaching its goals to satisfy customers' quality requirements, to comply with regulations or to meet environmental objectives. ISO 9000 has gained in popularity as the number of certifications that have been issued soared to more than 776,000 in 161 countries as of December 2005 (ISO, 2006).

ISO 9000 related scholar research has been extensively conducted from many perspectives; for example, the implementation process (Bhuiyan & Alam, 2005), benefits and barriers (Singh & Mansour-Nahra, 2006), relationship with quality performance (Gotzamani & Tsiotras, 2001) and country-specific experiences (Quazi & Padibjo, 1998). The favourable view emphasises that ISO 9000 increases employees' awareness in quality issues and encourages continuous improvement through regular and imperative quality audits. Its clear requirements offer a good first step towards TQM, for which there are no clear

*Corresponding author. Email: kuo@bm.nsysu.edu.tw

requirements and directions. The adverse view states that companies focus mainly on quick and easy certification, without real commitment to quality. This may result in increasing bureaucracy and reduce flexibility and innovation. These basic arguments of both views were mainly based on personal assertions and isolated experiences of certified companies (Gotzamani & Tsiotras, 2001).

The popularity of ISO 9000 implementations, unfortunately, also translates into a dilemma. With mixed success in implementation, praise and criticism on ISO 9000 certification are easy to find from trade magazines, news media and the business community. These standards do not seem to provide many external benefits and competitive advantage any more, as most competitors in the industries that require ISO registration are already registered. Those companies are now looking for tangible internal benefits from the new ISO 9000:2000 standards (Casadesus & Karapetrovic, 2005). It is essential for managers to understand the influence of ISO 9000 certification towards their organisation's performance on quality management from the employees' perspective, that is, empirically relate the effectiveness of ISO 9000 certification to quality performance and to the overall performance of the organisation. Most of the empirical data from the literature were collected from managers who were involved in the implementation of ISO 9000 and have a vested interest in making claims for the benefits of ISO implementation. Our research focused on the opinions of employees who followed the company's policy to implement ISO quality management systems. This research becomes the first report that explores how employees perceive the effectiveness of ISO 9000 implementation.

This study begins by reviewing the extraneous contextual factors which influence management initiatives' effectiveness. The next section briefly reviews the process of developing the measurement instrument that emerges from the literature. Finally, the psychometric properties of the measures are examined and implications for managerial decision making are given.

Extraneous contextual factors

The interaction between management initiatives and the organisation's performance is complex and may be influenced by many extraneous contextual factors. The nature of business (manufacturing versus service) is one of the common factors to be considered. Although the ISO 9000 standard was organised in a user-friendly format with terms easily recognised by all business sectors, the principles and practices of quality management were originally developed from the manufacturing settings. Academics and practitioners have shown great interest in transferring and applying them to service sectors, such as SERVQUAL (Parasuraman et al., 1985). Recent developments concerning TQM have supported the contingency model of the application of TQM core principles into different environments (Sitkin et al., 1994). Woon (2000) conducted a study among 240 Singaporean companies which participated in the Singapore Quality Award programme and found that the service organisations generally showed a lower level of TQM implementation than the manufacturing organisations. Prajogo (2005) investigated 194 managers of Australian firms and found no significant difference in the level of most TQM practices and quality performance between the two sectors.

The size of business has frequently been discussed in TQM research. Size of organisation, as reflected by the employment size, did have a significant effect on the overall TQM implementation level. Large-sized companies achieved compliance with a majority of requirements better than the small-sized companies, but all of them do not significantly differ (Park et al., 2007). Small organisations face certain difficulties, including lack of

financial and human resources, in implementing TQM as compared to larger companies (Woon, 2000). Ragothaman and Korte (1999) noted that managers of smaller firms had a stronger belief that ISO 9000 registration results in cost reduction and export potential increase than did managers of large firms.

The temporal effect of quality management systems is the third mediating effect studied in this research. The 1994 version of ISO 9000 standards causes a great number of discussions and serious controversy on their long-term effectiveness (Gotzamani & Tsiotras, 2001). An empirical survey of 399 companies conducted in 2002 found that the perceived benefits of the ISO 9001/2/3:1994 implementation have also decreased over time (Casadesus & Karapetrovic, 2005). While some studies (e.g. Brecka, 1994; Singels et al., 2001) show that companies registered to the standard for a longer period of time perceive greater benefits than the ones that have been just recently registered, others (e.g. Jones et al., 1997; Terziovski et al., 2003) demonstrate just the opposite, namely that benefits actually decrease with time since registration. There are also findings that the passage of time since registration does not have any significant effect on perceived benefits (e.g. Leung et al., 1999).

The framework of Total Quality Management

TQM has evolved beyond its roots in statistics and quality control function. While quality scholars and practitioners continuously try to clarify the dynamics of a holistic process and framework of TQM, it is believed that TQM is a framework of integrated and inter-functional means of achieving and sustaining competitive advantage (Saraph et al., 1989). That is, TQM is an integrated management philosophy and set of practices that establishes an organisation-wide focus on quality (Curkovic et al., 2000) to achieve customer satisfaction and improved business performance (Samson & Terziovski, 1999). Quality is a composite measure of all aspects of an organisation's supplier, product, process and service quality performance (Brah et al., 2002), such as reliability, durability, customer service, features and aesthetics, as well as conformance to specifications (Flynn et al., 1995). Recently, research has begun to utilise the Malcolm Baldrige National Quality Award's (MBNQA) criteria as the best framework for an interdisciplinary approach to Total Quality Management (Curkovic et al., 2000; Lee et al., 2003; Wilson & Collier, 2000).

MBNQA identified six building blocks as its criteria to evaluate quality performance. Causal models are proposed to reveal the relationships among the six building blocks and a quality performance category (Su et al., 2003; Wilson & Collier, 2000). These values and concepts, described below, are embedded beliefs and behaviours found in high performing organisations (NIST, 2006).

Leadership

Senior leaders should have strong, visible leadership to create a customer focus strategy with high expectations. A leader should not only enable an organisation to engage in continuous improvement but also ensure the creation of strategies, systems and methods for achieving performance excellence, stimulating innovation, building knowledge and capabilities and ensuring organisational sustainability. This element is considered the major 'driver' of TQM (Samson & Terziovski, 1999), which included acceptance of quality responsibility by top management and participation by top management in quality improvement efforts (Saraph et al., 1989).

Strategic planning

The emphasis is on customer-driven quality and operational performance excellence as key strategic business issues that need to be an integral part of overall business planning. Effective strategic and business planning and development of plans, along with the focus on the requirements of customers, suppliers and other stakeholders are crucial to achieve excellence in a consistent and lasting way.

Customer and market focus

The organisation must be knowledgeable of customer requirements and responsive to customer needs through the measurement of customer requirements and expectations, implementation of customer service standards and measurement of customer satisfaction (Lee et al., 2003). It demands awareness of development in key processes for knowledge acquisition concerning current and future customers and markets. Customer-related information is disseminated through the organisation and the extent of customer complaint resolution (Samson & Terzioviski, 1999).

Measurement, analysis and knowledge management

This dimension examines the adequacy of use of data and information to maintain a customer focus, to derive quality excellence and to improve operation performance. Organisations depend on effective measurement systems for understanding and improving performance at all levels. Process-related quality information compilation and usage should derive from business needs and strategy. This item aims to examine the organisation's key processes for knowledge acquisition concerning customer, product and service performance; comparisons of operational, market and competitive performance; supplier, employee, cost and financial performance; and governance and compliance.

Human resource focus

Striving to maintain high levels of quality depends on the best use of the talents and abilities of an organisation's entire work force. This represents the consistent alignment of an organisation's human resources practice with its strategic direction. In addition, better employee and partner satisfaction results from employees' success in having opportunities for personal learning and practising new skills.

Process management

Organisations are sets of interlinked processes, and improvement of these processes is the foundation of performance improvement. The organisation's ability to provide systematically quality of goods and services is based primarily on how well an organisation designs and introduces products and services, integrates production and delivery requirement and manages performance of suppliers (Brah et al., 2002). Organisations have experienced dramatic performance improvements through many practical techniques, for example, clarity of process ownership, boundaries and steps, use of statistical process control, selective automation, foolproof process design, preventive maintenance and employee self-inspection (Saraph et al., 1989).

Quality performance

Quality performance is a composite measure and difficult to define precisely. The performance element of TQM focuses on quality performance, operational and business performance indications. The measures include customer satisfaction, employee morale, productivity, quality of output and delivery performance. Instead of using the results categories of MBNQA, which are designed to examine the performance of the applicant's organisation, this research adopted the quality performance evaluation criteria of Brah et al. (2002) from the perspective of plant level (Flynn et al., 1995; Saraph et al., 1989).

Supplier performance

With ever-shorter product life cycle in today's markets, it is becoming easier, quicker and more economical for companies to co-operate with suppliers to respond to customer requirements effectively. Supplier performance played an important role in an organisation's quality performance and its contribution to customer satisfaction. Poor quality of incoming parts significantly compromised the organisation's capabilities to address many manufacturing situations, such as excessive inspection, reworks and returns, purchasing and overproduction (Brah et al., 2002).

Employee service quality

Involvement of people is one of the basic principles of ISO 9000. Successful implementation will lead to people at all levels actively seeking opportunities to enhance their own performance, knowledge and experience. The quality level of employee service to customers includes availability, responsiveness, timeliness, completeness and pleasantness.

Product/service process quality

Organisations design processes to provide systematically products and services, which meet customers' expectations and needs more efficiently. The key benefits of quality processes include lower costs, shorter cycle times and improved, consistent and predictable results.

Customer satisfaction

Organisations depend on the creation of a quality culture of achieving business excellence through customer satisfaction. The goal of satisfying the customer is fundamental to TQM and is expressed by the organisation's attempt to understand current and future customer needs, and meet customer requirements through designing and delivering quality products and service. The rationale for this principle is the belief that customer satisfaction is the most important requirement for long-term organisational success and requires the entire organisation to be focused on the customers' needs.

Employee satisfaction

The success of organisations is achieved through people and not through the use of systems no matter how good they are. In such organisations, all employees (not just managers) are encouraged to think strategically about their jobs and business and empowered to produce better results. People with the right environment training and tools will assume personal responsibility for the quality of their work.

Methodology

A survey instrument was developed and tested for its reliability and validity. Respondents were asked to mention the degree to which they witnessed changes as a result of their ISO certification. The questionnaire was divided into two sections. Section A consists of 32 questions on the general overview of the company in terms of quality management practices. The adopted survey questionnaire was designed in line with the Malcolm Baldrige quality award criteria (Quazi & Padibjo, 1998). Some minor modifications and additions were made that were necessary in order to structure the questionnaire to suit the utility context. Section B consists of 15 questions on the current quality performance level of the company. Five performance constructs are identified based on the literature review (Brah et al., 2002).

The case company, a large utility company consisting of 70 business divisions, had successfully been certified in ISO 9000 system for all of its divisions. Based on operational characteristics, business divisions are classified as 'manufacturing' if the primary product of a unit is related to the generation of utility, otherwise they will be treated as 'service'. The size of business divisions are arbitrarily classified as following: more than 500 employees is a large unit; 200–500 employees is a medium unit; and less than 200 employees is a small unit. The level of experience with ISO certification is classified as 'experienced unit' for units that have been certified more than five years, and 'novice unit' for units certified within five years. As answering the questions requires the in-depth knowledge of the quality management practices, and quality performance of their own business branches, the target respondents of the survey were senior employees, or quality, business and line managers who participated in the whole ISO certification process of their own division. Applying stratified random sampling, 440 questionnaires were sent out to employees of 55 business divisions via company internal social networking. The number of returned questionnaire is 332, with 305 being valid. The return rate of valid questionnaire is 69.32%.

A descriptive statistics profile of the survey respondents is provided in Table 1.

The reliability and validity of the questionnaire

To establish the credibility of the instrument, reliability and validity tests were performed. A reliable measurement instrument will give the same results, even though different people took the test or under different circumstances. The Cronbach's alpha reliability coefficient, that is, internal consistency, is the most popular method testing an instrument's reliability. Generally, values higher than 0.7 are regarded as satisfactory. Tables 2 and 3 show all coefficient values of each construct of this research. All values are above 0.70, indicating very high reliability of scales.

Table 1. Profile of survey respondents.

Nature of operation	Manufacturing: 152 (49.84%) Service: 153 (50.16%)
Size of division	Large: 77 (25.25%) Medium: 176 (57.70%) Small: 52 (17.05%)
Length of certification	Experienced: 185 (60.66%) Novice: 120 (39.34%)

Table 2. Internal consistency analysis of TQM constructs.

Construct	Before ISO certification	After ISO certification
Leadership	0.82	0.86
Strategic planning	0.87	0.90
Customer and market focus	0.91	0.92
Measurement and analysis	0.82	0.81
Human resource focus	0.89	0.91
Process management	0.88	0.88

Entries are Cronbach's alpha.

Table 3. Internal consistency analysis of quality performance constructs.

Construct	Alpha
Supplier performance	0.84
Employee service quality	0.89
Product/service process quality	0.89
Customer satisfaction	0.74
Employee satisfaction	0.85

Entries are Cronbach's alpha.

Detail item analysis

Detail item analysis (Nunnally, 1967) is a method that was developed to evaluate the assignment of items to scales. The method considers the correlation of each item with each scale. Specifically, the item-score to scale-score correlations are used to determine if an item belongs to the scale as assigned, belongs to some other scale or if it should be eliminated. If an item does not correlate highly with any of the scales, it is eliminated. Nunnally recommends a factor loading of at least 0.30 as a guideline to determine whether a variable is part of a factor. As seen in Table 4, all 32 items are evaluated and showed high correlations with original scales thus justifying the appropriateness of the assignment to the scales. Accordingly, it was concluded that all items had been appropriately assigned to scales. Since the detail item analysis results were satisfactory on the first iteration, the items reported in Table 4 are the final scale items.

Construct validity

The validity of a measure refers to the extent to which it really measures the concept or the phenomenon that it was intended to measure. Three types of validity are generally considered: (1) content validity; (2) criterion-related validity; and (3) construct validity. Content validity can only be checked qualitatively/subjectively, by its approval from experts on general agreement among all aspects of the variable being measured. The basic TQM categories and the elements in each category were extracted from extensive literature review on TQM theory and each TQM area separately, from the most popular quality gurus' theories and the national quality awards (MBNQA) requirements, as described under previous section 'The framework of Total Quality Management'.

Criterion-related validity evaluates the extent to which a measuring instrument relates to an independent measure of the relevant criterion. For the combined set of six measures of TQM measurement criterion related validity was evaluated by examining the multiple correlation coefficients computed for the six measures and a measure of quality

Table 4. Item to scales correlation matrix.

	Item	Scale (Mean)					
		1	2	3	4	5	6
Leadership	1	0.867*	0.592	0.515	0.537	0.562	0.512
	2	0.824*	0.487	0.481	0.457	0.508	0.427
	3	0.866*	0.590	0.504	0.554	0.568	0.585
	4	0.804*	0.504	0.405	0.534	0.474	0.468
Strategic planning	5	0.542	0.862*	0.582	0.624	0.552	0.585
	6	0.561	0.877*	0.593	0.639	0.573	0.588
	7	0.574	0.868*	0.519	0.610	0.610	0.592
	8	0.580	0.884*	0.583	0.646	0.638	0.632
Customer and market focus	9	0.544	0.574	0.822*	0.556	0.583	0.628
	10	0.432	0.484	0.836*	0.508	0.574	0.539
	11	0.472	0.530	0.838*	0.514	0.577	0.569
	12	0.428	0.489	0.827*	0.516	0.538	0.534
	13	0.490	0.625	0.828*	0.569	0.602	0.604
	14	0.444	0.544	0.836*	0.540	0.551	0.569
	15	0.456	0.523	0.795*	0.510	0.517	0.552
Measurement and analysis	16	0.537	0.623	0.548	0.860*	0.541	0.530
	17	0.528	0.555	0.557	0.876*	0.592	0.546
	18	0.542	0.674	0.540	0.828*	0.533	0.528
Human resource focus	19	0.578	0.630	0.568	0.587	0.759*	0.593
	20	0.511	0.563	0.549	0.554	0.758*	0.559
	21	0.521	0.499	0.545	0.488	0.814*	0.528
	22	0.504	0.554	0.571	0.530	0.821*	0.586
	23	0.441	0.504	0.492	0.489	0.804*	0.558
	24	0.446	0.539	0.525	0.514	0.763*	0.569
	25	0.462	0.547	0.570	0.505	0.812*	0.599
	26	0.498	0.477	0.498	0.457	0.779*	0.606
Process management	27	0.469	0.574	0.572	0.498	0.608	0.755*
	28	0.458	0.492	0.529	0.484	0.586	0.809*
	29	0.504	0.530	0.507	0.441	0.539	0.825*
	30	0.477	0.600	0.573	0.551	0.636	0.841*
	31	0.416	0.500	0.517	0.492	0.534	0.734*
	32	0.514	0.580	0.609	0.529	0.575	0.812*

Note: * = the highest value of the correlation coefficients in the row.

performance. The average of five measures of quality performance forms a single composite measure of quality performance. The multiple correlation coefficients of the quality performance measure and the six measures of quality management is 0.726 (Table 5). Hence, it can be concluded that the six measures of quality management have a high degree of criterion-related validity when taken together.

Finally, construct validity was assured by applying factor analysis separately in each TQM category. If each factor were valid as a construct, then its set of variables would form

Table 5. The multiple correlation coefficient of the quality performance measure.

Model	R	R square	Adjust R square	Std error of the estimated	Change statistics					
					R square change	F change	df1	df2	Sig. F change	Durbin-Watson
1	0.726	0.527	0.518	0.3619	0.527	55.343	6	298	0.000	1.723

Table 6. Summary of each metric for TQM constructs.

	# of factor extracted	KMO	Item loading range	Eigenvalue	% variation explained
Leadership	1	0.818	0.779–0.878	2.831	70.78
Strategic planning	1	0.798	0.861–0.885	3.049	76.23
Customer and market focus	1	0.885	0.804–0.843	4.777	68.25
Measurement and analysis	1	0.706	0.820–0.873	2.193	73.09
Human resource focus	1	0.900	0.755–0.822	4.984	62.30
Process management	1	0.869	0.730–0.847	3.811	63.52

a single factor once again. All but two Kaiser-Meyer-Olkin (KMO) values are above meritorious 0.80 figures (Table 6).

The above analysis proved that the TQM measurement instrument developed for this research measured, both reliably and accurately, the companies' performance on TQM elements.

Data analysis and discussions

The effect of ISO registration on quality management practices T tests were used to explore the impact of ISO registration on level of quality management practices for before registration and after registration. The results indicate that the differences between these two stages of ISO registration are statistically significant at the 0.000% level (Table 7).

The result provides strong support that ISO registration has a positive impact on quality management practices. Of these six quality management criteria, measurement and analysis has the highest overall mean difference rating (0.4775) followed by customer and market focus (0.4258).

The effect of size on quality management practices

T tests were carried out to evaluate the impact of ISO registration on quality management practice within the proxy of size of divisions. The results of the t test (Table 8) indicate that, at 0.000% significant level, all have significant improvements in management practices after registration regardless of size. However, the most improved areas are different in terms of size. Measurement and analysis and strategic planning are the most improved

Table 7. Summary of before and after certification.

	Mean (before reg.)	Mean (after reg.)	Difference	t	Significant (2 tails)
Leadership	3.7180	4.0869	0.3689	12.498	0.000
Strategic planning	3.7406	4.1459	0.4057	13.422	0.000
Customer and market focus	3.5138	3.9369	0.4258	13.891	0.000
Measurement and analysis	3.5388	3.9945	0.4775	13.199	0.000
Human resource focus	3.5574	3.8631	0.3057	11.989	0.000
Process management	3.5213	3.8574	0.3361	13.837	0.000

All entries are significant at $p < 0.000$, 2 tails.

Table 8. The effect of divisional size on quality management practices.

	Difference of means (Before and after registration)		
	Large	Medium	Small
Leadership	0.2857	0.3878	0.4279
Strategic planning	0.3019	0.3736	0.6683
Customer and market focus	0.2709	0.4456	0.5879
Measurement and analysis	0.3463	0.4678	0.5769
Human resource focus	0.2565	0.2926	0.4231
Process management	0.2273	0.3485	0.4551

All entries are significant at $p < 0.001$, 2 tails.

areas for large divisions, measurement and analysis and customer and market focus for mid-size divisions and human resource focus and customer and market focus for small divisions. At a glance, small divisions report the biggest improvement (largest difference), medium size followed and large ones have the least improvement.

The effects of the nature of operations on quality management practices

Similarly, t tests were carried to examine the impact of the nature of operations on ISO 9000 certification to quality management practices. All entries (Table 9) show significant improvement in quality management practices. Service experienced better improvement than manufacturing in five out of six areas investigated.

The effect of the length of implementation on quality management practices

A unit has been ISO 9000 certified more than five years is classified as an experienced unit, otherwise it is classified as a novice unit. T tests were carried out to examine the effect of ISO 9000 registration in manufacturing and service branches. All entries (Table 10) are significant at the level of 0.001. The experienced branches have more improvement than novice ones.

The effect of ISO registration on quality performance

Five constructs for quality performance were adopted (Brah et al., 2002) to examine the effects of ISO 9000 registrations. These constructs are supplier performance, employee service quality, employee satisfaction, customer satisfaction and processes quality.

Table 9. The effect of the nature of operations on quality management practices.

	Difference of means (Before and after registration)	
	Manufacturing	Service
Leadership	0.3520	0.3856
Strategic planning	0.4359	0.3758
Customer and market focus	0.3994	0.4519
Measurement and analysis	0.4364	0.4749
Human resource focus	0.2985	0.3129
Process management	0.3136	0.3584

All entries with $p < 0.001$, 2 tails.

Table 10. The effect of the length of certification on quality management practices.

	Difference of means (Before and after registration)	
	Novice units	Experienced units
Leadership	0.2812	0.4275
Strategic planning	0.3312	0.4541
Customer and market focus	0.3226	0.4927
Measurement and analysis	0.3944	0.4955
Human resource focus	0.2583	0.3365
Process management	0.2694	0.3793

All entries are significant at the $p < 0.001$ level, 2 tails.

The effect of plant size on quality performance

One way ANOVA was employed to examine the effects of plant size on quality performance. Employee satisfaction and process quality did not statistically reach the significant level, that is, plant size does not affect the quality performance within these two constructs (Table 11). However, employees from larger units gave more positive responses than those who are in smaller units in the areas of supplier performance, employee service quality and customer satisfaction.

The effects of the nature of operations on quality performance

T tests on quality performance to the operation properties are not significant in all constructs, that is, ISO registration is equally effective on both manufacturing and service units (Table 12). The mean values in all cases reveal that employees agreed that ISO registration does help improving quality performance regardless of the nature of operations.

The effect of the length of certification on quality performance

T tests on quality performance to the length of years after registration are not significant in all constructs, that is, ISO registration is equally effective on all units regardless of how

Table 11. The effect of size on quality performance.

		Sum of square	Degree of freedom	Mean sum of square	F	Sig.
Supplier performance	Between	2.660	2	1.330	3.609	0.028
	Within	111.287	302	0.369		
	Total	113.948	304			
Employee service quality	Between	2.484	2	1.242	3.675	0.026
	Within	102.078	302	0.338		
	Total	104.562	304			
Employee satisfaction	Between	2.875	2	1.437	2.292	0.103
	Within	189.368	302	0.627		
	Total	192.243	304			
Customer satisfaction	Between	4.620	2	2.310	6.342	0.002
	Within	109.990	302	0.364		
	Total	114.610	304			
Process quality	Between	1.948	2	0.974	2.876	0.058
	Within	102.275	302	0.339		
	Total	104.223	304			

Table 12. The effect of the nature of operations on quality performance.

		Samples	Mean	Std Dev.	T	Sig. (2 tails)
Supplier performance	Manuf.	152	3.7149	0.6458	1.751	0.081
	Service	153	3.5926	0.5725		
Employee service quality	Manuf.	152	3.8766	0.5966	0.815	0.416
	Service	153	3.8219	0.5769		
Employee satisfaction	Manuf.	152	3.5263	0.7822	0.468	0.640
	Service	153	3.4837	0.8099		
Customer satisfaction	Manuf.	152	3.7697	0.6248	-0.532	0.595
	Service	153	3.8072	0.6046		
Process quality	Manuf.	152	3.8273	0.6259	0.421	0.674
	Service	153	3.7990	0.5442		

Assume equal variance.

Table 13. The effect of length of certification on quality performance.

		Samples	Mean	Std Dev.	T	Sig. (2 tails)
Supplier performance	Novice	120	3.5694	0.5900	-1.941	0.053
	Exper.	185	3.7081	0.6217		
Employee service quality	Novice	120	3.8208	0.5943	-0.679	0.498
	Exper.	185	3.8676	0.5823		
Employee satisfaction	Novice	120	3.4333	0.7750	-1.267	0.206
	Exper.	185	3.5514	0.8068		
Customer satisfaction	Novice	120	3.7750	0.5608	-0.309	0.757
	Exper.	185	3.7973	0.6475		
Process quality	Novice	120	3.7813	0.5429	-0.765	0.445
	Exper.	185	3.8338	0.6122		

Assume equal variance.

long they have implemented the ISO 9000 quality management system (Table 13). The mean values in all cases reveal that employees agreed that ISO registration does help improving quality performance.

Conclusions

The development and certification of an ISO 9000 quality assurance system really boosts TQM performance, providing a good first step towards TQM. The results showed that all certified divisions experience significant improvement on the level of quality management practices regardless of the nature, size and length of implementation of business branches from the employees' perspective. The employees recognise significant improvements in quality management practices after certification. In general, the concepts of quality management are applied more in large companies than in small companies, that is, large firms achieve better quality performance compared to smaller firms. In addition, the length of implementation of TQM programme affects quality performance (Brah et al., 2002). Our results, however, show mixed reflections on these observations. Small divisions claim more improvement than large ones. Service experienced better improvement than manufacturing in five out of six areas investigated. Experienced divisions enjoy more improvement than novice ones.

The effects of ISO certification on quality performance are not as consistent as the effects on quality management practices. The size did not affect the quality performance

in employee satisfaction and process quality. Large divisions gave a more positive response than small ones in the area of supplier performance, employee service quality and customer satisfaction. Regardless of the nature of operations, manufacturing and service divisions all agreed that ISO certification does help improve quality performance. As far as the length of registration is concerned, ISO registration is equally effective among experienced and novice divisions.

One major limitation of this study is that the sampled business branches are all within one large company with the same level of top executives' commitment on ISO registrations. Top management commitment is one of the paramount factors for many management initiatives' success. In addition, it is impossible to determine the absolute values and the relative differences between the levels of benefits reported by survey studies.

References

- Bhuiyan, N., & Alam, N. (2005). An investigation into issues related to the latest version of ISO 9000. *Total Quality Management*, 16, 199–213.
- Brah, S.A., Tee, S., & Rao, B.M. (2002). Relationship between TQM and performance of Singapore companies. *International Journal of Quality & Reliability Management*, 19, 356–379.
- Brecka, J. (1994). Study finds that gains with ISO 9000 registration increase over time. *Quality Progress*, 27(5), 18–20.
- Casadesus, M., & Karapetrovic, S. (2005). The erosion of ISO 9000 benefits: A temporal study. *International Journal of Quality & Reliability Management*, 22, 120–136.
- Curkovic, S., Melnyk, S., Calantone, R., & Handfield, R. (2000). Validating the Malcolm Baldrige National Quality Award framework through structural equation modeling. *International Journal of Production Research*, 38, 765–791.
- Flynn, B.B., Schroeder, R.G., & Sakakibara, S. (1995). The impact of quality management practices on performance and competitive advantage. *Decision Sciences*, 26, 659–691.
- Gotzamani, K.D., & Tsiotras, G.D. (2001). An empirical study of the ISO 9000 standards' contribution towards Total Quality Management. *International Journal of Operations & Production Management*, 21, 1326–1342.
- ISO. (2006). *ISO 9000 and ISO 14000 – in brief*. Retrieved from http://www.iso.org/iso/en/iso9000-14000/understand/basics/general/basics_3.html
- Jones, R., Arndt, G., & Kustin, R. (1997). ISO 9000 among Australian companies: Impact of time and reasons for seeking certification on perceptions of benefits received. *International Journal of Quality & Reliability Management*, 11, 650–660.
- Lee, S.M., Rho, B.H., & Lee, S.G. (2003). Impact of Malcolm Baldrige National Quality Award criteria on organizational quality performance. *International Journal of Production Research*, 41, 2003–2020.
- Leung, H.K.N., Chan, K.C.C., & Lee, T.Y. (1999). Costs and benefits of ISO 9000 series: A practical study. *International Journal of Quality & Reliability Management*, 16, 675–691.
- NIST. (2006). *Criteria for performance excellence*. Baldrige National Quality Program, National Institute of Standards and Technology. Retrieved from http://baldrige.nist.gov/PDF_files/2006_Business_Criteria.pdf
- Nunnally, J. (1967). *Psychometric theory*. New York, NY: McGraw-Hill.
- Parasuraman, A., Zeithaml, V.A., & Berry, L.L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49(Fall), 41–50.
- Park, D.J., Kim, H.G., Kang, B.H., & Jung, H.S. (2007). Business values of ISO 9000: 2000 to Korean shipbuilding machinery manufacturing enterprises. *International Journal of Quality & Reliability Management*, 24, 32–48.
- Prajogo, D.I. (2005). The comparative analysis of TQM practices and quality performance between manufacturing and service firms. *International Journal of Service Industry Management*, 16, 217–228.
- Quazi, H.A., & Padibjo, S.R. (1998). A journey toward Total Quality Management through ISO 9000 certification: A study on small- and medium-sized enterprises in Singapore. *International Journal of Quality & Reliability Management*, 15, 489–508.

- Ragothaman, S., & Korte, L. (1999). The ISO 9000 international quality registration: An empirical analysis of implications for business firms. *International Journal of Applied Quality Management*, 2, 59–73.
- Samson, D., & Terziovski, M. (1999). The relationship between Total Quality Management practices and operational performance. *Journal of Operations Management*, 19, 393–409.
- Saraph, J.V., Benson, P.G., & Schroeder, R.G. (1989). An instrument for measuring the critical factors of quality management. *Decision Sciences*, 20, 810–829.
- Singels, J., Ruel, G., & van de Water, H. (2001). ISO 9000 series: Certification and performance. *International Journal of Quality & Reliability Management*, 18, 62–75.
- Singh, P.J., & Mansour-Nahra, P. (2006). ISO 9000 in the public sector: A successful case from Australia. *TQM Magazine*, 18, 131–142.
- Sitkin, S.B., Sutcliffe, K.M., & Schroeder, R.G. (1994). Distinguishing control from learning in Total Quality Management: A contingency perspective. *Academy of Management Review*, 19, 537–563.
- Su, C.T., Li, S.C., & Su, C.H. (2003). An empirical study of the Taiwan National Quality Award causal model. *Total Quality Management & Business Excellence*, 14, 875–893.
- Terziovski, M., Power, D., & Sohal, A. (2003). The longitudinal effects of the ISO 9000 certification process on business performance. *European Journal of Operations Research*, 46, 580–595.
- Wilson, D.D., & Collier, D.A. (2000). An empirical investigation of the Malcolm Baldrige National Quality Award casual model. *Decision Sciences*, 31, 361–390.
- Woon, K.C. (2000). TQM implementation: Comparing Singapore's service and manufacturing leaders. *Managing Service Quality*, 10, 318–331.

Appendix 1. Questionnaire

Leadership

I personally conduct regular reviews of quality performance on my product/service.
 I always maintain close contact with customers.
 I enforce Total Quality Management to all my staff in all operations.
 I give quality issues top priority as criteria when making decisions.

Strategic planning

I do regular strategic planning.
 My business has clear quality goals.
 My strategic plan is linked to quality values.
 My planning process includes continuous quality improvement.

Customer and market focus

I collect data to monitor changes in my customer satisfaction.
 I systematically ask customers what they expect in my product/service.
 I systematically ask customers if they are satisfied with the product/service they purchased from me.
 We record all customers' complaints.
 I look for the cause when I lose a customer.
 I know what my customers expect from me.
 I use customer complaints to improve my product/service.

Measurement and analysis

I carefully collect data on all facets of my business.
 I analyse all the work processes in my business.
 Key performance figures are always available to my managers for decision making.

Human resource focus

We work as a team with clear goals.
My staff are aware of my long-term business goals.
I encourage personal growth of my staff.
I reward staff who help improve my product and service quality.
Each member in my business is encouraged to develop new ways to do their job better.
All staff in my business understand how their tasks fit into an overall plan of things.
I ensure that all my staff are focused on continuous improvement efforts in all areas.
All my staff receive appropriate training and are able to do more than one task.

Process management

I continually make improvements in my products and services.
In the past year I have introduced at least one new product/service to my customers.
I have improved at least one feature of my product/service in the past year.
I monitor all production processes and introduce continuous improvement whenever possible.
I use statistical process control to monitor my production processes.
I always incorporate quality factors in my product/service design.

Supplier performance

There is co-operation from our suppliers in resolving quality problems.
The number of on time deliveries has increased.
Performance of supplied parts has improved.

Employee service quality

Our employees are able to meet changing customers' needs.
Our employees are always there when customers need them.
Our employees perform the service right the first time.
All of our employees are able to leave a good impression on customers.

Employee satisfaction

There is less absenteeism among staff.
There is lower staff turnover rate.

Customer satisfaction

The number of customer complaints is fewer.
The speed of handling customers' complaints is quicker.

Process quality

Cost of quality (error, scrap, rework and inspection) as a percentage of total sales decreased.
Delivery in full on time to customers increased.
Defects as a percentage of production/service volume decreased.
Warranty claims cost as a percentage of total sales decreased.
The quality of our product in comparison to other products in the industry has improved significantly.

Copyright of Total Quality Management & Business Excellence is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.